Spring 2002 Flood Across Western and Central Upper Michigan

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1. Introduction

The late winter season record setting snowfall in February and March set the stage for spring floods in 2002. During February and March of 2002 north-central and western parts of Upper Michigan observed over 100 inches of snowfall. At the National Weather Service (NWS) Office, located in Negaunee Township, 175 inches of snow fell during those 59 days. That was an average of nearly 3 inches of snow per day. The maximum snow depth during this two month period at the NWS office was 41 inches. This year's snow pack held over 11 inches of water in north central and western Upper Michigan.

Daily Maximum (red) and Minimum (blue) Temperature (F), Precipitation (green) (in.), and Snow Depth (light blue) (in.) for 1-19 April 2002

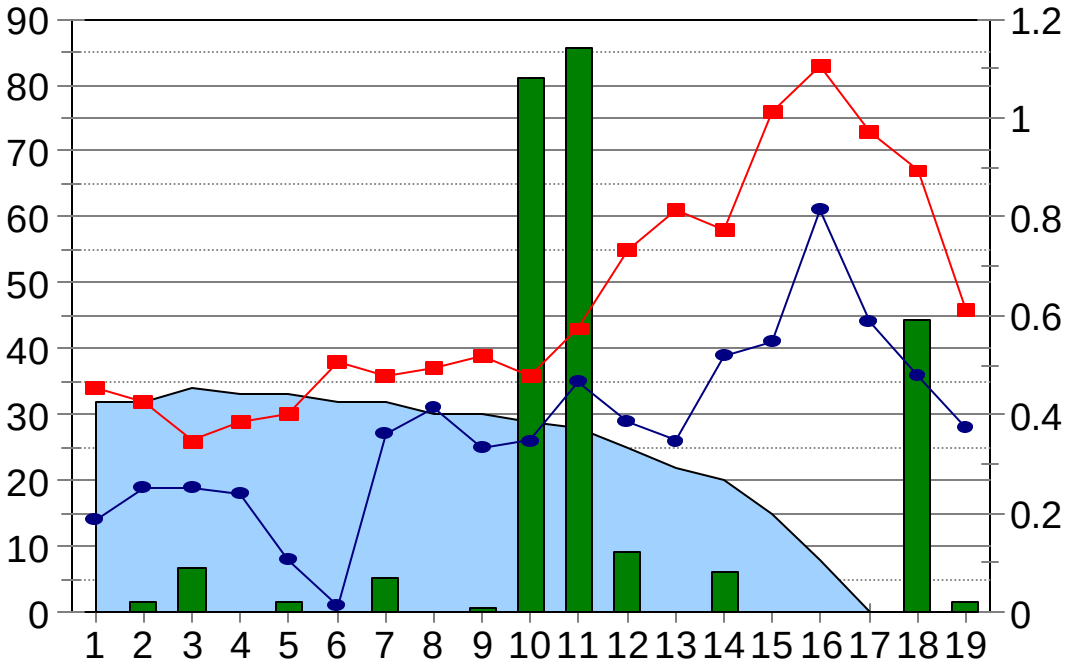

Figure 1. The above graph illustrates the maximum temperature (Red) and minimum temperature (Blue), snow depth in inches (light blue) (y-axis left), and precipitation in inches (green) (y-axis right) for the first 19 days of April 2002 (x-axis) at the National Weather Service Office located in Negaunee Township in Marquette County.

2. Synopsis

The snow quickly melted during a 6 day period, 11-17 April 2002, and over 11 inches of water was released from the snow pack into the creeks, streams, rivers, and lakes. To exacerbate the situation, over 2 inches of rainfall occurred 10-12 April 2002 over much of Upper Michigan and record high temperatures in the 70's and 80's were recorded on the 15th and 16th . During those two days a very dramatic snow melt occurred. In the matter of just hours, the ground turned from white to green. To complicate matters further, moderate rain during the morning of the 18th and severe thunderstorms in the afternoon and evening

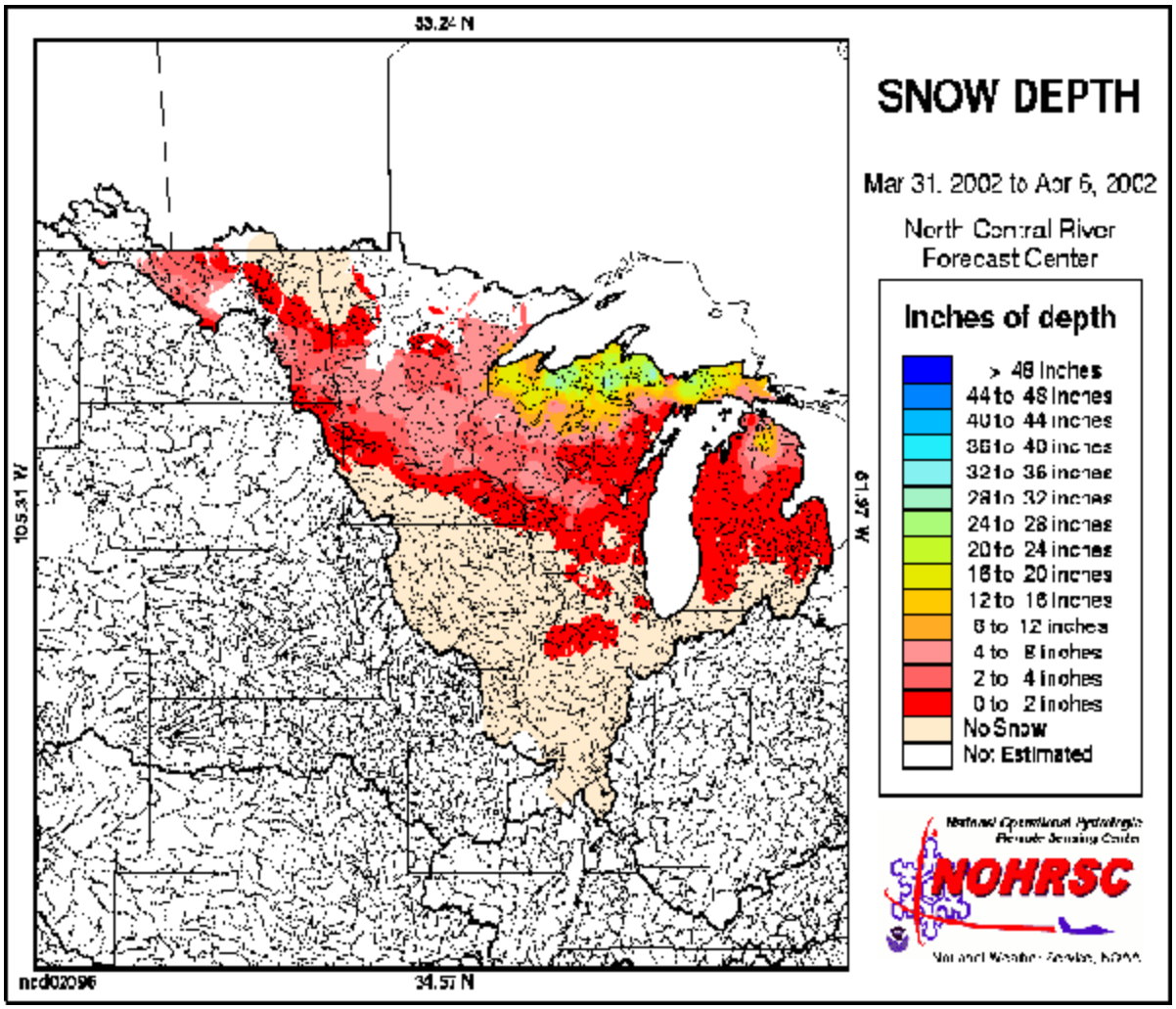

Figure 2. Snow depth the week before the flooding in Upper Michigan.

dumped up to an additional 1.5 inches over an already saturated and flooded Upper Peninsula.

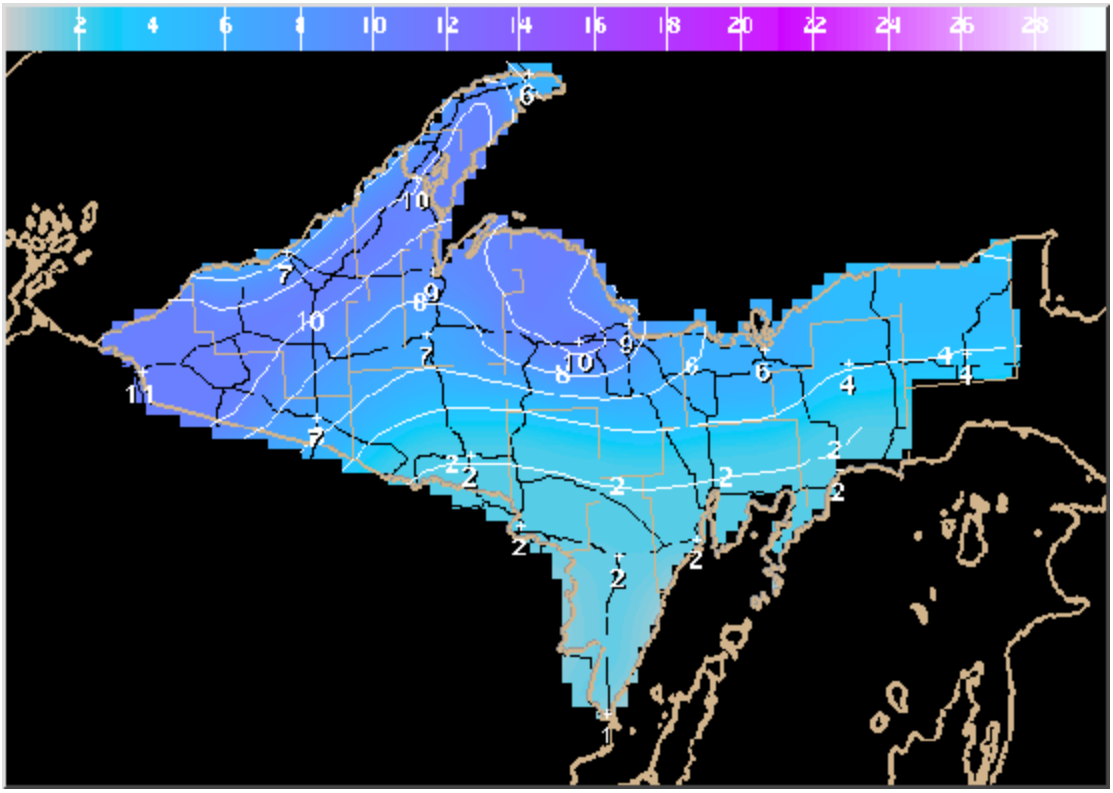

Figure 3. Estimated water equivalent in the snow pack in inches during the week prior to the flooding in Upper Michigan. This information is supplied by the National Operational Hydrologic Remote Sensing Center, which uses gamma radiation emitted by the Earth to measure the water content of the snow pack.

3. Impacts

Following the rain and warm temperatures, local rivers and streams began to rise to bankfull and flood. Many local and county roads were closed due to high water and several dams were in jeopardy of failing. Localized flooding of low lying areas from small creeks or runoff was common across the western and central parts of Upper Michigan. Major flooding on rivers and lakes occurred in 8 counties of the Upper Peninsula.

Figure 4. A car is submerged in Wakefield, MI.

A. Gogebic County

Gogebic County was the hardest hit area in Upper Michigan. A state of emergency was declared by Governor, John Engler, and the county was later declared a disaster area. The towns of Ironwood and Wakefield sustained the greatest damage. Sunday Lake, in Wakefield, filled quickly and overflowed, spilling water into the adjacent streets of Wakefield. Approximately 160 homes and businesses were affected by the rising waters. Most of these structures were evacuated, and sandbagging efforts got underway to save the state police post and other structures in the area.

Figure 5. Tobin Road in Wakefield covered in 5 feet of water.

Other impacts in Gogebic County included a partial dam failure of the Wood Bire-Presque Isle Wildlife Dam near Marenisco, where a 10 ft. sections of the dam was washed out. Two other dams were in jeopardy of failing due to the high water levels as well: McDonald Dam and Sunday Lake Dam but they held their own as water topped the structures. The Montreal River near the Wisconsin border flooded causing section of US-2 to be closed at times, including all 4 bridges that cross the Montreal River at the Wisconsin-Michigan state border. Nearly 50 homes and businesses were evacuated in the city of Ironwood. The force of the water washed out sections of roads and driveways. The flood waters also deposited debris throughout the city streets and lawns of residents.

Other highways that were impacted include: US-2 at M-28 were closed into Wakefield, M-64 and US-2 were closed at Marenisco, and as many as 25 local and county roads were also closed. One of these roads, East Shore Rd. had a 40 ft. section washed out near Lake Gogebic. The Black River near Bessemer peaked at 12.3 feet at 4:00 pm EDT on 16 April 2002. Bankfull stage on the Black River at Bessemer is 5.0 feet. The flooding that occurred on the Black River is estimated to be a 25 year flood. The Ontonagon River near Paulding peaked at a record flood level of 10.6 feet at 10:00 am EDT 17 April 2002. Flooding along the Ontonagon River near Paulding is estimated to be a 50 year flood.

Figure 7. Residents of Wakefield sandbagging.

B. Marquette County

In Marquette County, rising river levels on the Chocolay, Peshekee, East and Middle Branches of the Escanaba, and Michigamme forced people from their homes and camps. Hundreds of houses experienced water damage in their basements, while dozens of homes experienced water in their first floor. The hardest hit towns were Republic, South

Figure 6. Montreal River flooding Ironwood, Michigan on 16 April 2002.

Republic, Gwinn, and Harvey. Other small streams and creeks experienced flooding also, especially in low lying areas and woodlands.

The high water level and increased flow on the Carp River washed out a section of M-553 near Marquette Mountain Ski Area.
The county road was left with a 65 foot
washout, closing the road indefinitely.

The Chocolay River at Harvey peaked at 10.1 feet which is 1.1 feet above flood stage. The Chocolay River remained above flood stage for 6 days. The Escanaba River at Gwinn peaked at 7.9 feet at 1 pm EDT on 17 April. This river remained above flood stage for 3.5 days. The Escanaba River at Humboldt peaked at 8.5 feet 10 am EDT on 17 April 2002. The river remained above flood stage for 4.5 days at this location. The flooding that occurred on the Escanaba River near Humboldt is estimated to be a 25 year flood.

The Peshekee River near Champion crested at 10.7 feet at midnight 18 April 2002. The flooding that occurred on the Peshekee River is estimated to be greater than a 100 year flood. This river crest is similar to a crest of 10.9 feet that was recorded back in 1985.

Figure 8. Two culverts washed out on M-553 near Marquette Mountain Ski Area.

C. Ontonagon County

Ontonagon County experienced flooding as well. M-28 was closed for more than 3 days near Bergland and Merriweather due to high water, and many secondary roads were also closed because of flooding and wash outs from flooding creeks and streams. One washout in particular happened on Norwood Rd.

Figure 9. Sandbagging efforts in South Republic in Marquette County.

D. Baraga and Houghton Counties

Baraga County experienced flooding on the Sturgeon River and other small creeks and streams. In Houghton County there was also flooding of local roads and structures along the Sturgeon River south of Chassell.

The Sturgeon River near Alston crested at 11.9 feet on 18 April 2002. Flood stage at this location is 8 feet. This flooding is estimated to be a 25 to 50 year flood. Near Sidnaw on the Sturgeon River, the river crested at 11.4 feet on 17 April 2002. This is estimated to be a 50 to 100 year flood event.

E. Menominee, Dickinson, and Iron Counties

The Menominee river flooded along the border with Wisconsin. Local roads were flooded and some homes and businesses had to be evacuated due to the rising water. There was significant flooding of the lowland and wood land as well. The Paint River near Crystal Falls in Iron County reached flood stage and impacted local roads and structures.

The Paint River at Crystal Falls crested at 9.5 feet on 17 April 2002. Flood stage is at 7.0 feet.

Figure 10. Boardwalk along the Paint River in Crystal Falls.

4. Products Issued by the National Weather Service Office

This spring, the Marquette NWS Office worked with the North Central River Forecast Center (NCRFC) in Minneapolis to increase river forecasting services across Upper Michigan. Previously, the NCRFC provided the Marquette NWS with river forecasts for the Ontonagon River near Rockland. Forecasting services were expanded to include five additional sites, including the Chocolay River near Harvey, the Escanaba River at Gwinn, the Sturgeon River near Alston, the Paint River near Crystal Falls, and the Michigamme River near Crystal Falls. Each of these rivers reached flood stage this spring and the expansion of river forecasts allowed the Marquette NWS to provide a greater level of service.

Date	Product Issued	
9 April	Hydrologic Outlook was issued highlighting heavy rain potential and unseasonable warm temperatures which would accelerate melting of the snowpack.	
10 April	Flood Statement for:	Urban and Small Stream Flooding Due to Heavy Rainfall
11 April	Flood Statement for:	River Levels Approaching Flood Stage on the Sturgeon River near Alston
12 April	Flood warnings issued for:	Chocolay River near Harvey Sturgeon River near Alston
14 April	Flood warning issued for:	Escanaba River at Gwinn
16 April	Flood warning issued for:	Escanaba River at Humboldt
17 April	Flood warnings issued for:	Paint River at Crystal Falls Peshekee River near Champion Gogebic and Ontonagon Counties
	Flood Watch for:	Potential Dam Failure on the Presque Isle River near Marenisco.
	Flash Flood Warning for:	Wood Bire Presque Isle Wildlife Dam Failure

5. Conclusions

Flood waters began to recede and river levels fell sharply over the weekend of the 20th as temperatures cooled back down to seasonal normals and it remained dry for 2 days. Although the final cost will not be calculated for a while, preliminary data has put the cost well into the millions of dollars. In Gogebic County alone, the estimated cost of public property that was destroyed was 18 million dollars. There were no fatalities or injuries due to the record flooding.

Such a costly flood must be examined and studied for future impact, readiness, and forecasting of river flooding. Residents of Upper Michigan will not soon forget the spring

floods of 2002.

6. Acknowledgments

Figure 6 : This photograph was taken by Michigan State Police.

All other photographs and figures were taken or created by National Weather Service Personnel.